

Availability and reliability of Hadoop clusters in HDInsight

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In this video, we seek to understand the high availability of nodes, how to access nodes, check the status of services, and configure your node sizes.

Hadoop achieves high availability and reliability by distributing redundant copies of services and data across the nodes in a cluster.

However, standard distributions of Hadoop typically have only a single head node.

Any outage of the single head node can cause the cluster to stop working.

To address this potential problem,

Linux-based HDInsight clusters on Azure provide two head nodes to increase the availability and reliability of Hadoop services and running jobs.

Nodes in an HDInsight cluster are implemented using Azure Virtual Machines.

In the event that a node fails, it is taken offline and a new node is created to replace the failed node.

While the node is offline, another node of this same type will be used until the new node is brought online.

Here are the various nodes.

Head nodes, some implementations of

Hadoop have a single head node that host services and components that manage the failure of worker nodes smoothly, but any outages of master services running on the head node would cause the cluster to cease to work.

HDInsight clusters provide a secondary head node which allows master services and components to continue to run on the secondary node in the event of a failure on the primary.

Nimbus nodes.

For Storm clusters, the Nimbus nodes provide similar functionality to the Hadoop job tracker.

By distributing and monitoring processing across worker nodes, HDInsight provides two Nimbus nodes for the Storm cluster type.

ZooKeeper nodes.

ZooKeeper nodes, ZKs, are used for leader election of master services on head nodes and to ensure that services, data, or worker nodes, and gateways, know which head node a master service is active on.

By default, HDInsight provides three ZooKeeper nodes.

Worker nodes, worker nodes perform the actual data analysis when a job is submitted to the cluster.

If a worker node fails, the task that it was performing will be submitted to another worker node.

By default, HDInsight will create four worker nodes.

However, you can change this number to suit your needs both

during cluster creation and after cluster creation.

Finally there is the edge node.

An edge node does not actively participate in data analysis within the cluster but is instead used by developers or data scientists when working with Hadoop.

The edge node lives in the same Azure virtual network as the other nodes in the cluster and can directly access all other nodes.

Since it is not involved in analyzing data for the cluster, it can be used without any concern of taking resources away from critical Hadoop services or analysis jobs.

Access to the cluster over the Internet is provided through a public gateway and is limited to connecting to the head nodes.

And if an R Server on HDInsight cluster, the edge node, access to services running on the head nodes is not affected by having multiple head nodes, as the public gateway routes request to the head node that hosts the requested service.

For example, if Ambari is currently hosted on head node 1, the gateway will route incoming requests for Ambari to that node.

You can connect to nodes that are not directly accessible over the Internet by using one of the following methods.

SSH, once connected to a head node using SSH you can then use SSH from the head node to connect to other nodes in the cluster.

Then there's SSH Tunnel.

If you need to access a web service hosted on one of the nodes that is not exposed to the Internet, you must use an SSH Tunnel.

Finally, there is the Azure Virtual Network.

If your HDInsight cluster is part of an Azure Virtual Network, any resource on the same virtual network can directly access all nodes in the cluster.

Either the Ambari web UI or the Ambari REST API can be used to check the status of services that run on the head nodes.

The Ambari web UI is viewable at <https://CLUSTERNAME.azurehdinsight.net>.

Replace CLUSTERNAME with the name of your cluster.

If prompted, enter the HTTP user credentials for your cluster.

The default HTTP username is admin, and the password is the password that you entered when creating the cluster.

When you arrive on the Ambari page, the installed services will be listed on the left side of the page.

There are a series of icons that may appear next to a service to indicate status.

Any alerts related to a service can be viewed using the Alerts link at the top of the page.

You can select each service to view more information on it.

While the service page provides the information on the status and configuration of each service, it does not provide

information on which head node the service is running.

To view this information,
use the Hosts link at the top of the page.

This will display hosts within the cluster,
including the head nodes.

The Ambari REST API is available over the Internet and
the public gateway handles routing requests to the head
node that is currently hosting the REST API.

While connected to a head node through SSH,
log files can be found under /var/log.

For example, /var/log/hadoop-yarn/yarn
contains logs for YARN.

Each head node can have unique log entries, so
you should check the logs on both.

You can also connect to the head node using the SSH file transfer
protocol or Secure File Transfer Protocol, SFTP, and
download the log files directly.

Similar to using an SSH client, when connecting to the cluster,
you must provide the SSH user account name and
the SSH address of the cluster.

From the Ambari Web UI, select the service you wish to view
logs, for example, YARN, and then use Quick Links
to select which head node for which to view the logs.

The size of a head node can only be selected during cluster
creation.

You can find a list of the different VM sizes available for
HDInsight including the core, memory, and local storage for
each on the HD Insight Pricing page.

When creating a new cluster,
you can specify the size of the nodes.

In Azure Portal, when creating a new cluster,
you're given the option of setting the size or
pricing tier of the head, worker, and
if used by the cluster type, ZooKeeper nodes for the cluster.

With Azure CLI, when using the Azure HDInsight cluster
create command, you can set the size of the head, worker and
ZooKeeper nodes by using the head nodes size,
worker nodes size, and ZooKeeper nodes size parameters.

And with Azure PowerShell, when using
the New-AzureRmHDInsightCluster cmdlet, you can set the size of
the head, worker and ZooKeeper nodes by using the head node VM
size, worker node size, and ZooKeeper node size parameters.